

# Psychological Bulletin

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## CHILD PSYCHOLOGY NUMBER

Edited by

J. E. ANDERSON

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# THE PSYCHOLOGICAL BULLETIN

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## A REVIEW OF THE PUBLISHED WRITINGS OF BIRD THOMAS BALDWIN<sup>1</sup>

BY DOROTHY E. BRADBURY  
*Iowa Child Welfare Research Station*

This review presents a summary of the published writings of Bird Thomas Baldwin in the field of child development and related fields.

Dr. Baldwin's interest in the child as reflected in his published material began with the defective child, changed to the delinquent and adolescent, and finally to the preschool age child. A total of 130 references are cited in this review; these include abstracts of speeches given by Dr. Baldwin before various organizations.

### GENERAL PSYCHOLOGY

Dr. Baldwin's earliest contributions were in the field of general psychology. The purpose of the investigation reported under the title *Association Under the Influence of Different Ideas* (1) was to study the influence of two or more starting points on the association of ideas. The starting points were nonsense syllables, concrete or abstract words pronounced by the investigator or shown on cards, or pictures. The subjects recorded the associations occurring during a period of fifty seconds. The findings were: (1) Common conscious elements in association may be predominantly visual, auditory, olfactory, gustatory or kinaesthetic. (2) There was no idea without a motor fringe. (3) Impulses to movement or other emotional attitudes may act as determining factors in association.

<sup>1</sup> Professor Baldwin (1875-1928) was for many years a cooperating editor of this Journal.

In an early syllabus of psychology for first year students (5), Dr. Baldwin wrote in the preface "The genetic point of view is emphasized throughout, but not to the sacrifice, it is hoped, of the purely introspective method, which must necessarily characterize psychology as an empirical science. The dominant purpose is to promote an appreciation of mental life and to emphasize its relation to culture, to conduct, and to education; and to offer definite concrete applications of the laws which aid or hinder mental growth." A preliminary outline of this syllabus is also available. A brief appreciation of Wilhelm Wundt written by Dr. Baldwin is listed (61).

A series of monographs and articles dealing with Dr. Baldwin's work in the field of occupational therapy at Walter Reed General Hospital during the World War has appeared (45, 46, 48, 52, 53, 56). A popular account of the work has also been published (50).

#### CHILD DEVELOPMENT

##### *Mental Growth*

Dr. Baldwin's early interest in the mental test as a measure of mental development is reflected in an abbreviated form for giving the Stanford-Binet (2).

In 1911, Dr. Baldwin published a description of the work done at Vineland under the direction of H. H. Goddard on mental deficiency (16). The author concluded that "defectives are worthy of careful study . . . for the scientific insight they offer into the mental processes of normal children and the problem of education."

Dr. Baldwin's early interest in the delinquent was shown by a study of thirty-seven delinquent white girls and thirty delinquent negro girls (22, 23). A substitution test consisting of a transliteration of a section of Franklin's autobiography into a wig-wag code was given in sixteen practice periods of five minutes each on consecutive days. Many of the delinquent adolescent girls were found to be of inferior mentality. In the amount of work done the negro girls were inferior to the white girls. The purpose of the study (44) of one thousand delinquent boys and girls given the Yerkes-Bridges scale was to analyze the mental traits of juvenile delinquents as well as to evaluate the scale itself. The correlations obtained showed that (1) the scale needed revising and (2) social deviation of the nature of delinquency is correlated with mental deficiency. In a study of



two individual cases of mental retardation (34, 36, 45), the limitations of the Binet scale were pointed out. The author indicates the significance of different levels and irregularities in development due to the lack of educational training and home environment.

In a summary of the status of the honor system in American colleges and universities based on a questionnaire sent to 425 institutions Baldwin (28, 39), and Baldwin, Messner, and Greene (37) report that 123 institutions had the honor system in some departments; 101 had the honor system in all departments.

A series of reviews on adolescence beginning in 1913 was written by Dr. Baldwin (9, 19, 30, 42). In *The Boy of High School Age: The Moral and Religious Development of the Adolescent Boy* (20), the physical and mental development of the boy during adolescence is discussed. It is pointed out that the early part of adolescence, the period from twelve to sixteen, is a period of moral awakening; the later period, from sixteen to twenty, one of religious awakening.

In the *Mental Growth of Normal and Superior Children* (78), Baldwin and Stecher studied the Stanford-Binet examinations of 143 children between the ages of five and fourteen, fifty-six children having two examinations, fifty-one having three examinations, forty-two having four examinations and thirty-six having five examinations. The conclusions were: (1) The mental growth curves are strikingly similar to the physical growth curves in height. (2) A significant change in trend is observed at the approach of adolescence. (3) The curves of the rate of mental growth are higher for superior than for average children and the general prepubertal increase appears earlier in the case of superior children. (4) The I.Q. is only approximately constant during successive examinations. The coefficient of correlation between all examinations within the four groups is high, ranging from  $.72 \pm .05$  to  $.93 \pm .02$ . (5) There is a similarity in the mental growth curves of brothers and sisters. (6) The mean mental age of the physiologically accelerated group is higher than the mean mental age of the physiologically retarded. In a later report (77, 79) the authors conclude that for practical purposes the I.Q. remains sufficiently constant for a group as a whole but that individual records are smoothed out in obtaining averages.

Baldwin and Stecher's *The Psychology of the Preschool Child* (103) is of interest to the psychologist and to persons with a scientific interest in the child. Tests of clinical value in the study

of young children are given tentative norms. The book includes reports of experiments in general intelligence, learning, motor control, perception, association and language, aesthetics, rhythm, design, and concepts of weight, number, and time. In addition there are sections dealing with the daily program of the preschool laboratories, educational activities, and social development of preschool children.

The series of four Wallin peg boards was used in a study of form perception and motor control by Baldwin and Wellman (131). The subjects were 269 children between the ages of two and six years. Repeated tests for the purpose of studying development were given, in some cases as many as six times. The specific findings were: (1) In general, the mean scores on the four boards increased with age, and the mean errors and time decreased with age. (2) No consistent sex differences were found. (3) Perseveration was frequent, particularly at the younger ages, and decreased with age and increasing definiteness of form discrimination. (4) Order was used when the task was relatively easy but was subservient to a difficult new element. (5) Repeated tests required less time than the first test.

Dr. Baldwin, Dr. Lorle I. Stecher, and Madorah E. Smith (89) published a review of the literature in the field of child development in 1923. A similar review was published by Dr. Baldwin in 1928 (122).

In *Heredity and Environment—or Capacity and Training* (126, p. 406), Dr. Baldwin criticized the *Twenty-Seventh Yearbook of the National Society for the Study of Education on Nature and Nurture* as being based on the assumption that "the ratings of a few imperfect intelligence test scores stand for a very intricate, complex and unchangeable phenomenon back of the scores—intelligence with which individuals are endowed at birth"; thus giving a very restricted interpretation of nature by neglecting the rich fields of research in genetics, biology, physiology, anthropology, and embryology. He suggested that in intelligence scales it would be better to substitute the terms capacity and training for heredity and environment. Another discussion of capacity and training is listed (114).

In *Standardization* (35), Dr. Baldwin pointed out that standardization is not something new but a criterion based on customs, practice, or experimentation.

The following references indicate Dr. Baldwin's interest in the

superior child (12, 13, 40, 55, 59, 63, 67, 69, 74, 75, 77, 78, 79, 81, 83, 93, 94, 97, 99, 105). In *Methods of Selecting Superior or Gifted Children* (97, p. 36), Dr. Baldwin states that "For purposes of scientific analysis and explanation, the writer takes into consideration for every child, five parallel and interrelated ages: (1) a chronological age in years, months, and days, denotive of the temporal span of life—this is an arbitrary age and its importance has been greatly overestimated in educational work; (2) a physiological age denotive of the stages of physical growth and maturity—this is the basic age; (3) a mental age denotive of the growth of certain mental traits, capacities, interests, and abilities; (4) a social age or religious age (the two may be combined for the purposes of this paper) denotive of the growth of social attitudes and the ability to make, adapt, and control social adjustments; (5) a composite educational age denotive of the rate and position of school progress. These five ages are all present at any chronological age of the child's development. A child may have reached its maximum in one or more of the four ages, excluding the chronological age, yet be retarded in others. For example, a boy or girl may have normal physical development and be retarded educationally, socially, or morally; or any of the other combinations may occur. He or she may be potentially normal with remediable physical and mental defects or disabilities which cause temporary or permanent retardation. Fairly accurate methods of measuring exist for the second, third, and fifth ages, and the approaches to the fourth are steadily being standardized. In a normal standard child, each age is devoping at a maximal rate of growth with the physiological, mental, social, moral, and educational ages balancing each other."

The relationship between mental and physical growth was the subject or an aspect of a number of investigations (12, 13, 26, 27, 40, 55, 64, 69, 74, 75, 77, 78, 79, 94, 105). In general, it was found that the mental growth curves were strikingly similar to the physical growth curves in height. The mean mental age of physiologically accelerated children was higher than the mean mental age of the physiologically retarded.

Two preliminary reports dealing with the psychological findings of the study of the rural child conducted by the Iowa Child Welfare Research Station are listed (104, 130). This study is to appear soon in book form. A number of popular articles by Baldwin and O'Hagan (64, 65, 66, 67, 76) on various aspects of child development have been published.

*Physical Growth*

Dr. Baldwin's earliest contribution in physical growth was a general outline designed as a guide for teachers in observing the grosser physical defects (14). *Physical Growth and School Progress* (27) is the first attempt to follow consecutively the same groups. The records include consecutive measurements on the same individuals for periods of three to twelve years of height, weight, and lung capacity together with the school marks of these children. The subjects were 861 boys and 1,063 girls in elementary and high schools in Chicago and New York. The author concluded that if pedagogical age was accepted as a fair equivalent for mental development the tall heavy boys and girls with good lung capacity were older physiologically and more mature mentally in terms of school progress than the short light boys and girls. Two preliminary reports (12, 13) and a popular account (26) of this study are listed.

The material and charts in *A Measuring Scale for Physiological Age* (40) are supplementary to the previous study, *Physical Growth and School Progress*. Score cards are presented for boys and girls five years, six months to seventeen years, six months, according to the Baldwin-Boas norms for height, weight and lung capacity with graphs on which the child's development can be plotted. The individual growth curves of eight girls, including the time of menstruation, show that tall girls mature earlier than short girls. In a study of 1,317 adolescent city boys and 3,600 adolescent country boys, divided according to prepubescence and postpubescence, it was found that pubescent changes occur earlier in country boys.

Perhaps the outstanding contributions of the book, *The Physical Growth of Children from Birth to Maturity* (64), were the basing of growth norms on consecutive measurements of the same individuals and the intercorrelation of various physical traits. The book includes sections on the growth of infants, preschool children, and school children. The development of the carpal bones as a criteria of anatomical development and the advent of pubescence or first menstruation as a measure of physiological development are used in this study. The book includes an extensive bibliography of physical growth.

In *The Scientific Prediction of the Physical Growth of Children* (84), Dr. Baldwin states that there are definite laws of growth for different types of children when classified on the basis of stature, sex, physiological age, parentage, and nationality. The significance



of any particular period of growth depends on what the ultimate stature of the individual should be. In another article (62), he emphasized the point that there should be different standards for tall and short children, native and foreign born children, and that growth standards should be based on consecutive measurements on the same individual children. Two popular accounts of his work in physical growth are listed (55, 98).

*The Baby's Record* (71) is a book of record blanks including the essential facts in the infant's mental, physical, emotional, and social development that the parent should observe. Baldwin and O'Hagan (65) published an account for mothers of the work on physical growth.

Baldwin and Smith (111) have published a study of the physical growth of two generations of one family. In *New Standards of Physical Growth and Their Use in Nutrition Classes* (60), Baldwin outlined the nine basic criteria for formulating standards of physical growth. The use and abuse of physical indices of health and nutrition such as the weight-height-age standards are discussed in two articles (85, 100).

As a phase of Terman's investigation of the mental and physical traits of a thousand gifted children, Baldwin reported anthropometric measurements of 594 gifted children (105). He found that as a group the gifted children were above the best standards for American-born children for standing height and weight. With chronological age constant, a small but probably significant correlation was found between mental age and height for both boys and girls.

Baldwin (123) developed an objective method, as a supplement to other methods, of determining sex maturation in boys. The method was the identification of free sperm cells by an analysis of the urine passed on the first urination in the morning. The results were based on 1,136 specimens from 123 reform school boys between nine and seventeen years and fifty-four boys in a summer camp between ten and sixteen years. Spermatozoa were present in the urine of boys from eleven years, three months to seventeen years. In another article (121), Baldwin gave a series of correlations showing a significant relationship between growth in height and breathing capacity. Using these correlations as a basis, a plan of tabulation was devised giving height as well as age consideration. The study was based on 22,913 measurements for breathing capacity and height

of boys and 10,737 measurements for girls. Age, while not a negligible factor, was found to be less important than height. The means for boys at all ages are higher than those of girls. Younger children were more variable.

Among Dr. Baldwin's contributions to the methods of physical measurements is an article on Craniometry (11) in Monroe's *Cyclopedia of Education*, in which is given a brief history and description of the methods of measuring the human skull. A detailed description of the methods of anthropometry used at the Iowa Child Welfare Research Station is found in Dr. Baldwin's book, *The Physical Growth of Children from Birth to Maturity* (64). In a discussion of the aims and methods of anthropometry given before the National Research Council, Division of Anthropology and Psychology, Committee on Child Development (118, p. 2), Dr. Baldwin said, "A synoptic or outline picture of the physical size and proportions of a child or adult can be determined by a single series of measurements. The growth of the body as a whole and of proportions of the body of the child and the form of the body of the adult can be determined by means of a series of repeated measurements on the same person, including length, width and circumference of various parts, approximate volumes of selected parts and weight. . . ."

The study of *Anatomic Growth of Children* (132) was undertaken in an effort to obtain an objective measure of the anatomic development of the child as shown by the bones of the wrist, the epiphyses of the long bones of the lower forearm and the hand, and the sesamoid bones of the hand.

Examination was made of 1,300 roentgenograms of the lower forearms and wrists. The ages of the children varied from birth to seventeen years with a few additional cases over seventeen years. By inspection, a record of the number and the name of the carpals present, the number and location of the epiphyses, and the fusion of the epiphyses was obtained. A quantitative measure of the amount of ossification of the carpal bones was obtained by tracing the area of each carpal bone with a circumscribing disc planimeter.

Girls were in advance of the boys in time of first observation and fusion of the epiphyses of the hand and lower forearm. The distributions of areas of each carpal bone and the sums of the areas of all bones in age groups showed a wide range for each age and a large amount of overlapping in the ranges of age groups. There

were no significant differences in the means of the sums of the areas of the carpal bones of the right and of the left wrists. For age groups from one year, three months to seventeen years there was probably a significant difference in the mean total carpal area for the boys and girls at three and thirteen years and a quite evident difference at five, six, seven, fourteen, fifteen, sixteen, and seventeen years. The boys had the larger means after thirteen years.

A high or moderately high degree of relation between total carpal area and each of four physical traits, height, weight, width of shoulders, and width of hips, was shown for ages ten to sixteen for the boys and eight to twelve for the girls. The period of greatest correlation between total carpal area and the physical traits seemed to be present for boys and girls at their respective periods of accelerated anatomic development.

On a whole, the correlations between carpal area and the physical traits showed that the general skeletal size of the individual was a factor to be considered in judging anatomic maturity from the area of the carpal bones. In this study two methods are presented to allow for general skeletal size of an individual: (1) multiple regression equation, (2) anatomic index.

The anatomic index was a fine enough measure to discriminate the anatomic growth of one chronological year for boys from the two-year to the seventeen-year age group, and for the girls from the one-year, three-month age group to the fifteen-year age group. The mean anatomic index was significantly higher for the girls than for the boys at all ages from three to sixteen years.

Dr. Baldwin was responsible for the description of the methods of measuring given in *An Investigation of the Health of School Children* (113) by the Elizabeth McCormick Memorial Fund.

The Baldwin-Wood *Tables for Boys and Girls of School Age* (90, 91, 92, 101, 120) are widely used. Dr. Baldwin reported a further extension and revision of these tables for height and weight (106, 110) and also devised a scale for measuring height (70). In two additional articles he discussed increments of growth for different types of children with special reference to height, weight, and breathing capacity (72).

#### *Educational Growth*

Dr. Baldwin's earliest contributions to the study of educational growth were in the systematization of school observation. One of these contributions was a score card for rating efficiency in teach-

ing (4). He also published a guide to the observation of children in the school room (5, 7).

A series of reviews covering the field of educational psychology was written by Dr. Baldwin (32, 43, 96). In addition he published, either alone or in conjunction with another person, bibliographies on the following educational subjects: teachers' salaries (29), educational improvement and social reform (9), educational research (86). A report of the proceedings of the American Psychological Association in the 1912 meeting at Cleveland dealing with educational psychology is also listed (21). A course of readings designed for "those desiring a better understanding of the preschool child," prepared by Dr. Baldwin, has been published by the American Library Association in the *Reading for a Purpose Series* (129).

In a discussion of John Locke's contribution to education (22) Dr. Baldwin called attention to Locke's emphasis on native propensities and periods of child development. James, according to Dr. Baldwin, held the functional point of view in psychology and the biological point of view in education (17).

Three reports on the academic status of psychology by the Committee of the American Psychological Association, of which Dr. Baldwin was a member, are included (33, 41, 48). A special report of the work of the committee by Dr. Baldwin is also listed (38).

In an early article (8), Dr. Baldwin showed his interest in the child's activity when he considered play as the child's chief means of becoming adjusted to the world in which he lives. In an article dealing with the status of education (18), he advanced the argument that it was an empirical science with its own data, viewpoint, problems, situations, history, practices and opportunities for experimentation. The aim of the chapter (93) in *The Child, His Nature and His Needs*, was to present in a brief way some of the outstanding examples of the application of scientific knowledge to bridging the gap between child nature and the training of children. A knowledge of the child's mental and physical development is a factor in placing him in the grade in school in which he can do his best work. In addition the need of special provisions in the school for the mentally superior and inferior was pointed out. In *The Role of the Child in Progressive Education* (108, p. 160) the importance of the pre-school period from the standpoint of education was stressed. "The personality of the child is a changing complex unity working toward an almost predictable adult pattern . . . Educators and parents



have not yet realized or taken into consideration the unity of a child's personality."

The purpose of the article on *Methods of Selecting Superior or Gifted Children* (97) was to outline from the practical educational point of view, methods of analyzing the problem and to formulate scientific principles on which a practical system of selecting children for school promotion might be based. The concept of the superior child should include the physical, mental, social, moral, and educational ages of the child in addition to the relative development of special gifts or abilities. In *The Grouping of Pupils by Abilities in Elementary and High Schools* (181), Dr. Baldwin discussed educational provisions for the superior child.

In the field of experimental education Dr. Baldwin made a number of contributions. *Practice Schools in University Departments of Education* (15) presents the results of a questionnaire sent to thirty-three state universities, twenty-five privately endowed universities, and fifteen colleges concerning practice and experimental schools. *Studies in Experimental Education* (60) is a summary of an investigation conducted under the direction of Dr. Baldwin of 129 children who had failed to be promoted. On the basis of the Yerkes-Bridges point scale, a marked overlapping of abilities was found, although the children were, on an average, an inferior group. A study is also listed on an application of the Courtis tests of arithmetic to college students (31). Baldwin (49) studied the educational background of a group of wounded soldiers.

Two preliminary reports of the Cleveland study which is to appear in book form at an early date are listed. The first report (94) gives the purpose of the investigation as an attempt to provide practical school methods for promoting or advancing normal and superior children in accordance with the basic laws of child development. It was felt that this aim could best be accomplished through an analysis of the physical, mental, social, and educational make-up of the pupil. The second report (124) presents a cross section of the achievement of pupils in grades II-A to VI-A in five Cleveland Schools for three years, based on the Stanford Achievement test of approximately 2,500 children each year.

A series of descriptions of the preschool laboratories of the Iowa Child Welfare Research Station and of the experiments conducted by research workers in the laboratories appearing between 1919 and 1929 are listed (52, 56, 58, 73, 80, 87, 88, 95, 102, 107, 109, 112,

115, 119, 127, 133, 134). A brief description of a proposed department of eugenics is given (61). Dr. Baldwin discussed the parent education program of the Iowa Child Welfare Research Station at the Northwest Conference on Child Health, Minneapolis, 1927 (117). A report made by him as bureau manager of the Bureau of Child Development of the National Congress of Parents and Teachers is listed (128). In the *Administration and Scope of the Iowa Child Welfare Research Station* Dr. Baldwin said, "As its name implies, the Iowa Child Welfare Research Station is organized primarily for scientific analysis of the factors contributing to child betterment." "The points of view of the Research Station are those of the natural and applied sciences, where a limited number of definite problems are selected, and the conditions standardized so that the experiments and investigations may be repeated, modified and controlled."

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## BIBLIOGRAPHIES IN CHILD STUDY AND DEVELOPMENTAL PSYCHOLOGY

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The following selection of bibliographical material on the various phases of child study is undertaken to indicate major trends and to synthesize the better material with a minimum of repetition and with a maximum of efficiency and availability. It is qualitative only. (Elaborate quantitative analyses of subject-matter are suggested by the study of physical development by Scammon, 196.)

Research begins much later than 1658, when Comenius published the first picture-book for children. Mateer (73) excellently summarizes the pioneer studies of Preyer, Löbisch, Tain, Perez, Sigismund, Tiedemann, Vierordt, etc. In America, from 1880 to this day, the tremendous and enthusiastic inspiration of G. Stanley Hall stands out. So great was his influence that only within the last ten years have new and independent methods of research flourished. Thomas and Thomas (96) show some of these later techniques and the changes in trend and problems to be faced. (The slowness of progress is reflected by the fact that not until 1900 was the first Juvenile Court set up—in Chicago.) The world war made possible wholesale measurement of "intelligence" in the army camps; the results are only now being adequately weighed and understood. Present studies are being more carefully thought out and are being carried on by groups having better provisions for intensive study and greater facility in securing adequate numbers of children with which to work. The majority of such groups are connected with large universities having adequate organization and operating modern nursery schools.<sup>1</sup>

The general trend of subject matter has been quite definitely from the applied science of pedagogy to the pure science of psychological and sociological research, and from studies of a single child to the analysis of the behavior of children in large numbers and in groups.

<sup>1</sup> For details of Child Development Research Centers and their work see the July, 1930, issue of *Child Study*.

Simple diary-like techniques of observation are everywhere being replaced by carefully planned objective techniques. The researches of Thomas, Gesell, Anderson, Jones (and their associates), suggest these transitions. Progress in foreign countries has been outlined by Mateer (73), and by Chamberlain (7, 8)—a part of the encyclopedic work inspired by Hall.

Publications dealing with the child have increased in number. Journals of pedagogy and of philosophy, and, in addition, journals of psychology, physiology, education, genetics, sociology, and specialized publications give a large amount of attention to problems of child development. The latest American periodical in this sphere is *Child Development*, which appeared for the first time in March, 1930, significantly marking the present status of child study as a specialized branch of scientific research in its own right.

This brief survey, together with bibliographical material, will introduce an attempt to present in an ordered and logical sequence the material now available on the study of the child. Each title is selected from a mass of references as being, itself, frankly bibliographical, or as offering good references, with or without comment or annotation, on some special phase of child study, historically significant or valuable for orientation. In the main, references do not go back of 1900; many current studies are included. The criteria of selection are: recency of publication, number of references, amount of literature reviewed in text, annotation or abstraction, and foreign literature—in that order.

I. *General Bibliographies*: The bibliographies of Wilson (39-50) come first, both historically and for their content; continuous from 1898 to 1911, inclusive. Other series of reviews have been contributed by Baldwin and his associates (2-4), by Mitchell (24-26), by Monroe (27-31), by Smith (34-37), by the Child Study Association of America (9-11), and by the government Children's Bureau (12), and Bureau of Education (13, 21, 51, 52). The present extensive use of bibliographies for study courses began with Hall (19), and continues today in normal school courses (38), the suggestions of the Federation for Child Study (17), and in materials gathered by librarians (13, 33) in answer to many requests. Especially useful are Louttit's (20) comprehensive lists and Marston's (22) directory of some twenty fields of research in child development; both of which were sponsored by the National Research Council. Of the older references, compilations by Burn-



ham (6) and by MacDonald (21), contrasting strongly in bulk with that by Gordon (16), stand out. More recently, Odell (32) and Furfey (15) have supplied extensive and annotated bibliographies which are very helpful.

The majority of references to foreign studies will be found scattered through the various special topics treated below. A few of the older sources, however, are here cited. Ament (1) cites the progress in child study for the years 1895-1903, giving mainly French and German titles. Blum (5) may be mentioned for a review of the literature of child study during its infancy; he uses footnotes rather than the more convenient bibliography. Monroe (30, 31) and Chamberlain (7, 8) were early to realize the need to understand the work of other countries, and inspired Grundzinska (18) to help synthesize Polish contributions. A more recent source of French, English and Italian references is the general review by Delvolve (14).

II. *Textbooks*: Among the American general textbooks in child study, the following satisfy our criteria. Classics by Sully (94), Kirkpatrick (70, 71), Chamberlain (58), Mateer (73), O'Shea (87), and Stern (91, 92) are rich in references. The more modern texts, although written from very different points of view, are more carefully documented. Waddle (97) offers an early example; Niemeyer (86), Swift (95), and Furfey (66) study the first sixteen years; Strang (93) and Naumburg (85) stress the educational aspects; Thomas and Thomas (96) survey the literature critically from the sociological point of view; and Pyle (90), Cleveland (60), and Kenwrick and Kenwrick (69) present the importance of early training, writing from extensive practical experience.

Quite different in tone are the texts which serve as study outlines. Representing divergent interests, McKeever (74), McManis (75), Bascom and Mendenhall (55), Baker (53), Faegre and Anderson (61), Meek (76), and Whitley (100) have organized courses of study which are more or less general in scope and which are well documented. An unusually large number of references have been collected by Payne (88) and by Fuller (65) to indicate the international character of child protection, and its very gradual growth throughout history.

In France and Germany, the standard texts will give an adequate insight into foreign research. Claparède (59) has produced a classic with many references; Gundolin (67) cites an enormous list

of references; and Werner (99) reflects the modern interpretation of "developmental psychology" in search of general laws.

Certain specialized points of view have been presented with full references. Morton (78) tries to reconcile the various "psychoanalytic" theories of the child; Low (72) applies them to educational method; and Chadwick (57) and Bernfeld (56) write nontechnical texts from a mildly Freudian bias. The story of the nursery school is well told by Forest (63), both historically and critically; the more technical aspects of it are treated by Foster and Mattson (64) and by the editors of the Twenty-eighth yearbook of the National Society for the Study of Education (79-84). Clearest of all, the intensive study of the preschool years of development stands out above all other trends today, as the above-mentioned carefully edited yearbook, on preschool and parental education (77) will show: seventeen classified and abstracted bibliographies, with text; a total of 1,026 titles in all. This is a valuable source book. In addition, texts by Baldwin and Stecher (54), by Fenton (62), by Weeks (98), by Kamm (68), and by Pechstein and Jenkins (89) all point to this decided emphasis on the very young child.

III. *Emotional and Social Development*: A few general sources can be cited, such as Meltzer (113) on the development of social concepts; Busemann (102) on the excitation phases, with comments on the literature; Shuttleworth (123) and Jones and Jones (109), noting new trends; and the selected references listed in the twenty-eighth yearbook (115, 116). From the many books on mental hygiene, the following are selected for their documentation. The use of psychoanalysis is considered pro and con by Pfister (118), Morton (114), and Sachs (120), only the last named regarding it as of doubtful value. More orthodox in viewpoint are books by Averill (101) for the teacher, by Tilson (124) on habit clinics, and by Inskip (108) on growth and development as factors in child adjustment.

The experimental studies are quite arbitrarily divided as follows: Personality differences are found by Cushing (103) in perseverative tendencies, by Foster (106) in cases of jealousy, and by Marston (112) in a rating scale of Introversion-Extraversion plus five experimental conditions. Duffy (104) and Eng (105) have applied apparatus to detect the physical changes during emotional states. At the other extreme, Sayles (121) and Weill (126) have observed sociological data in the parent-child relationships; the latter lists a

very extensive bibliography. Suggestibility and negativism are favorite topics. Beginning with Otis (117), techniques have improved and definitions become clarified. The researches of Sherman (122) and of Reynolds (119) indicate the search for an experimental definition of terms.

A few miscellaneous studies meet our criteria. Harvey (107) writes on imaginary playmates and the like; Lonegren (111) edits an excellent list of references on juvenile courts, abstracting some; Washburn (125) has used Gesell's clinic to observe the smiling and laughing of infants; and Kasanin and Kaufman (110) have studied the relatively rare childhood psychoses, finding environmental stresses mixed with poor heredity as basic causes.

IV. *Language Development*: This is a field in which the changes have been frequent. Pelsma (152) typifies the older studies as well as summarizes them; Foulke and Stinchfield (137) give a more recent study of this out-moded type. For contrast, the excellent work of McCarthy (146) shows the trend from one or two cases or even from selected groups, to children at each age level, carefully selected by scientific criteria.

Many summaries of the literature exist. Trettien (155) gives one of the best of the earlier lists. The impetus of Hall is seen in studies by Doran (134) and Bateman (130, 131), tabulating earlier work; Gerlach (138) and Nice (150, 151) have contributed more recently. The true range of topics, points of view, and methods of observation are not seen until the recent reviews by the editors of the Twenty-eighth yearbook (148, 149), by Adams and Powers (127), by Powers (153), and by McCarthy (145) are studied. The wealth of material in these latest references gives a true idea of the problems faced and the changes in methodology. An idea of foreign methods and ideas will be found in a review of Piaget's theories by Isaacs (142), and in the summaries by Gutzmann (139, 140), by Wilker (157), and by Eng (136). General textbooks invariably reveal changes in trends. A comparison of books by the Sterns (154) and by Cook and O'Shea (133), Markey (144) with his own social theory, and Lorimer (143) from the philosophical bias, will repay and interest the student.

The more experimental studies, other than that of McCarthy (146) mentioned above, include one on number concepts by Douglass (135) wherein individual vocabulary studies are abandoned; a study of reading abilities by Hoffmann (141); a study of concepts far re-

moved from the pedagogically motivated studies prior to 1912, by Müller (147); and a correlational study by Van Alstyne (156) on three-year-old children. In addition to this type of study, a considerable literature exists on speech pathologies. Appelt (128, 129), writing from his own experience and subsequent practice of analytic theories, shows the changes in trend since Conradi (132) compared the various studies published at that time.

V. *Intellectual Development*: Only a strict adherence to the criteria of selection makes it possible to choose titles for inclusion here. No attempt has been made to survey the field of Intelligence Tests. For bibliographies in this field the reader is referred to the reviews by Freeman in the *PSYCHOLOGICAL BULLETIN* for the years 1911, 1912, 1913, 1914, 1915, 1916, 1917 and 1919 and to those by Pintner for 1926, 1927, 1928, 1929 and 1930. Freeman (162) offers a good list of references in addition to a classic textbook; this may be compared with the recent sourcebook by Moore (174) on reasoning ability. The experimental studies are suggested by the editors of the *Twenty-eighth yearbook* (175). In addition, Taylor (177) describes the minds of the sixth and seventh year mental ages; Burse (159) gives German and English studies on the young working youth; Meek (173), Kirkwood (168), and McGinnis (172) study the learning process, as such, in young children; Bergemann (158) analyzes visual memory by the method of reconstruction.

Studies of children's drawings have recently commanded considerable attention. The better studies are suggested in reviews by Eng (161) and by Goodenough (163). Both studies are carefully arranged, and the latter refers to six other bibliographies on the subject.

The applications of theories of precocity and handicap are fully treated. Dolbear (160) and MacDonald (171) give the key to the earlier studies; the former emphasizes case studies, while the latter systematically catalogs the work done. It is such work that make texts, such as that by Hollingworth (166), relatively easy to coördinate. Even fuller references are given by Henry (165) and by Jensen (167), from the educational standpoint. Equally important, Runge and Rehm (176) have studied the neglected child; Lundberg and Hood (169) give an exhaustive bibliography for the foster-home child; Lundberg and Lenroot (170) give a carefully abstracted study of the bibliographical material on illegitimacy. The influence



of physical handicaps upon intelligent behavior has been surveyed by Hare (164) and by Westenberger (178).

VI. *Heredity*: Only a portion of the studies in this field are of interest or value to the psychologist. Tanner (183) summarizes such studies up to about fifteen years ago, dealing mostly with physiology of the newborn baby. Recently Gesell (179) has approached the problem through the study of identical twins, to posit a maturation- or growth-potency. A general text, stressing the hereditary side of the issue, is found in that by Popenoe (181), which is well illustrated and extensively documented. Considerable literature is devoted to "inherited musical ability." Schüssler (182) seeks an anatomical-physiological basis. A list of references is offered, classified, by the editors of the Twenty-eighth yearbook (180).

VII. *Physical Development*: The extreme breadth of scope in this field will be evidenced in the following bibliographical material. The elaborate study-outline edited by Mendenhall (191) is heavily documented; McHale (190) gives many references regarding correlations with emotional, social, and educational make-up; Scammon (196) offers an excellent quantitative survey of the literature. A wealth of material is offered by the Children's Bureau (188), with careful classification and abstraction; by Bott, Blatz, and Chant (186) from a Canadian nursery school; by an anonymous British writer (184) with a medical bias; and by the editors of the Twenty-eighth yearbook (192-194) again. Some studies are abstracted. The above authors, taken as a unit, group well over three thousand titles on the general aspects of the problem of physical growth and development.

Some of the special fields may be studied by reference to the material brought together by Wellman (199) and by Burnside (187) in carefully controlled experiments, well documented, on walking and motor coördination. The literature on sleep will be readily grasped by scanning the exhaustive bibliography by Sidis (197), or by referring to a study by Terman and Hocking (198), or to the recent publication of results at Colgate University (189).

Less psychological in nature are the topics treated by Richardson (195) and by Berkowitz (185): breast feeding, and eye-sight troubles. They are included as representative of these topics.

VIII. *Play*: The increasing attention to how and at what and where our children play is recognized by the careful study outline

by Johnson (200). The bibliographical material is very extensive: Williams (202) cites about fifteen hundred titles, many of which are annotated; a topical classification of titles is presented by the editors of the Twentieth-eighth yearbook (201), but without reviews.

IX. *Adolescence*: The changes in treatment of this topic are very marked. The magazine *Child Study* pointed out in the April, 1930, issue the progress in child study as reflected in recent literature on adolescence, citing a selected list of references. In more detail, the foreign literature is outlined by Mendousse (209), from the educational point of view. General bibliographies have been contributed by Baldwin (203-206), and by Cavan and Cavan (208). The most useful recent list of references is that which critically summarizes hundreds of studies, usefully organized, with tables, figures, etc., in the new text by Brooks (207). Williams (210) also writes a careful text, but from the bias of mental hygiene, and with only a scattering of references.

X. *Moral Development*: The earlier studies in the field of morals will be critically treated by the authors quoted below. The foreign literature is summarized by Baumgarten (211) who writes on children's lies. The modern viewpoint of Catholicism is found in a study by McGrath (216), in which a standardized "moral information test" is given. This may be contrasted with the different techniques being developed at Iowa State University by Carmichael (213), Slaght (217), and others, under the guidance of Starbuck (218); extensive bibliographical material is offered by these three authors, some of which is annotated. A recent interesting suggestion is offered by Carlson (212) whereby art is used to counteract the bad effects of overstimulation from other sources. General summaries will be found in the contributions of Wilson (219), of Hall (215), and of Germane and Germane (214); two of these latter are textbooks for educational purposes.

XI. *Child Labor*: Finally, three references will acknowledge the very extensive literature on child welfare in industry, all sponsored by the efficient government Children's Bureau. Meyer and Thompson (222) give the earlier references, with indices and short abstracts; Matthews, McGill, and Merritt (221) offer a carefully documented study-outline, now replaced by a revised edition (220) in response to many requests for a brief analysis of information of the various aspects of child labor. The history, causes, legal status, and preventive measures are well discussed.

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## COLOR VISION AND COLOR PREFERENCE IN INFANCY AND CHILDHOOD

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This review presents a summary of the major investigations published between 1890 and 1931, concerning the color vision and color preferences of infants and children. The various methods of experimentation which have been employed may be grouped as follows:

*Methods involving language.* (a) The child is shown the colors and asked to name each in turn. (b) The child is taught the color names, and the length of time required to learn each of the different terms is noted. (c) The child is asked to give the name of his favorite color.

*Methods not involving language.* (a) A number of colors are placed before the child and record is made of the one he grasps or at which he looks. (b) The subject is given a colored sample and told to select from a pile of variously colored wools or papers those which are like the one he holds. (c) The child is told to select a "red" or a "blue" sample, as the case may be from an assortment of colors. (d) A number of colors are presented to the subject and he is asked to indicate the one he prefers.

The materials which have been used as a means of presenting the colors have usually been wools, papers, or painted surfaces. Bright saturated colors have predominated. The majority of studies have been carried out with school children as subjects, only a limited number dealing with infants and children under five.

Wolfe (43), in 1890, studied a large number of school children to determine their ability to name colors. He reported black, white, and red to be always correctly named. Green was more often known than yellow in the case of the younger children, but in later years this was reversed. A sex difference was found to exist in favor of the girls.

Extensive experiments were conducted on young Italian children by Garbini (11) in 1894. He used both the methods of silent match-

ing of colors and of color naming with subjects ranging in age from fifteen months to six years. The children between fifteen and eighteen months showed evidence of perceiving black and white only. By the end of the second year red and green were added, and by three years the development of color vision was complete. Color discrimination was found to precede the learning of color names. Red was the first color name to be learned, followed by green, yellow, orange, blue and violet in the above order.

The observations made by Shinn (34, 35) concerning the development of her niece include some reports of the child's reactions to color. Interest in bright colors, particularly red, occurred during the early weeks of life. By the age of six months red, orange, and yellow were all appreciated, but little interest was evident for blue and green during the first year. Experiments in matching painted tablets indicated that all of the colors were sensed and enjoyed by eighteen months, and by two years the child could discriminate as well as an adult. "Warm" colors were preferred until the third year.

Aars (1) studied eight subjects between three and seven years of age. He reports that saturated colors were preferred to unsaturated colors, and that both saturated and unsaturated colors were better liked than grays of equal brightness. The preference order was blue, red, green, yellow for the three year olds. The six and seven year old children gave first place to blue, the other colors receiving about equal rating.

Seventy-five children who had no knowledge of the spectral order of colors were found by Dobbie (8) to arrange them according to their spectral positions in a greater number of cases than could be accounted for by chance.

The most extensive studies on infants were those done in 1900 by Holden and Bosse (18). They used as subjects thirty infants under one year of age and nearly two hundred children between one and thirteen years of age. With the infants the methods for determining the presence of color vision was as follows: a cardboard of varying luminosity from black to white was used as a background, and tissue paper squares in spectral colors were placed on the portion of the background which corresponded in brightness. Perception of the color was recorded if the child grasped the paper. Under six months no reaction of grasping occurred. The seven and eight months old babies grasped red, orange, and yellow. A few of the



nine months old subjects also reached for the green, blue, and violet, and by the twelve months level all of the colors were grasped. Paired comparison of colored ribbons showed red, orange, and yellow to be preferred to green, blue, and violet, during the first three years of life. After this age the order was blue, violet, red, green, yellow and orange. Interest in blue began between two and three years.

J. M. Baldwin (4) studied one child between the ages of nine and eleven months. Colored papers were presented one at a time to the infant for her acceptance or refusal. Black was accepted the greatest number of times, followed by white, red, green, and brown. Yellow was not included, and pieces of newspaper were preferred to any of the colors.

The color vision of one subject was studied extensively by Marsden (22). Experiments were first carried out when the child was five months old. At this time two colored cards were held before the child's eyes and then moved slowly apart and the card which the infant's eyes followed was noted. Blue, green, yellow, black, red, white, brown and newspaper were the colored stimuli, and each color was paired with every other color. At this age there proved to be assured perception of yellow. Later, between the sixth and seventh month, colored balls were offered in pairs for grasping, and colored cards were presented on a neutral gray. The child showed preference and definite perception for red and yellow. Blue, green, and white were responded to less frequently. Newspaper was more popular than any of the colors. By sixteen months all of the colors were unquestionably perceived, as the child was able to discern colored papers and wools on equally bright gray backgrounds.

Preyer (30), after extensive tests and lessons with his child in color recognition and color naming reported that at twenty-seven months yellow was the most accurately perceived color, followed by red and black. Blue and green were not recognized until later. By the end of the fourth year the child could name all of the colors.

The knowledge of colors possessed by over two hundred German school girls was investigated by Lobsein (21). Red and blue were always named correctly, yellow and green were learned less easily, while orange and violet were not completely known at the age of fourteen years. The preference order was red, blue, green, with a decided lack of interest in yellow.

An interesting study in the recognition of colors was carried out by Engelsperger and Ziegler (10), with two hundred six year

olds as subjects. Both the method of asking the child to select a given color (*i.e.*, "red" or "blue," etc.) and that of naming a color presented to him by the experimenter were used. The ability to select a color when it was named for him was found to appear at an earlier age than the ability to name a designated color. The order of color recognition proved to be red, blue, green, yellow, gray, rose, violet, and orange. Tints were better known than shades. There was a slight female superiority.

The ability of one two year old child to learn color names is reported by Nagel (28). Red, green, and violet were learned easily, followed by yellow and lastly blue.

A series of tests in color matching, naming, and preference was carried out by Monroe (26) in which over five hundred children between the ages of two and six served as subjects. These children matched and named red the most successfully, followed by blue, yellow, green, orange, and violet in the above order. Colors were matched more correctly than they were named. Red and blue were the favorite colors. The girls were slightly better than the boys in both color matching and naming.

Two infants were given a series of tests for color vision by McDougall (23). Two otherwise similar objects (flowers, worsted balls, or papers) of different colors were offered to the subject simultaneously. McDougall reports that during the sixth month red, green, and blue were all grasped more than white or an equally bright or brighter gray. During the fifth month blue was less appreciated than red. Yellow was the most popular, but it was a novelty since it was introduced late in the series of experiments.

Myers (27) investigated the color vision of a child during the sixth and ninth months. Colored and gray cubes were placed in pairs on a black background, and offered to the baby. Red and yellow proved to be preferred to the other colors and to the colorless cubes. Light gray was grasped far more than dark gray.

Winch (41) tested two thousand school children merely by writing the names of the colors on the blackboard and having each child list them in the order of his preference. This order for the group proved to be blue, red, green, yellow, the girls rating blue higher than red, and the boys the reverse. There was an indication of a greater liking for green in the groups of upper social status.

A careful series of tests was carried out with one child during the sixth and seventh months of life by Woolley (44). Colored

papers were offered to the infant for grasping, each color being offered with gray and then with every other color. If the child reached for the color repeatedly when it was presented with gray, it was assumed that she perceived that color. The results indicated that the child unquestionably saw the red, yellow, and blue, and probably green, although this last color was less certain. In the tests of paired comparison red was decidedly preferred, yellow, and blue held intermediate and interchangeable places, and green was least liked. Black proved to be very interesting.

Tucker (39) tested one hundred twenty-eight school children for the purpose of comparing their color vision with that of primitive peoples. The tests used were an adaptation of those employed by Rivers (31, 32, 33) in his studies of uncivilized tribes, and included the matching, sorting, and naming of colored wools. The mistakes made by the children were remarkably like those of the primitive tribes. Blues and violets were confused more than the other colors, followed by the greens. Reds and yellows were matched and named the most successfully. The wools called by the same name were grouped together in the color sorting.

An extensive series of experiments on a young infant is reported by Valentine (40). The materials used were small skeins selected from Holmgren's wools, and the relative brightness of these colors was carefully determined. At the age of three months, before the child could reach, a pair of colored wools was held before the child's eyes for a brief period, and the number of seconds he looked at each color was recorded. Each color was presented with every other color. The seconds credited to the various colors show that the preference order was (1) yellow; (2) pink and white; (3) red; (4) brown and black; (5) blue and green; (6) violet. Although brightness and novelty influenced the child, choice could not be explained on these two factors alone. Valentine concludes that red, yellow, green, blue and brown were all sensed and liked by the infant, violet being doubtful. At the age of seven months the grasping method showed yellow to still be the favorite color, with red second.

A few subnormal children were studied by Peters (29) for the purpose of determining the cause of color confusion in sorting wools. A preliminary test was given to discover the ability of each subject in color discrimination. Then the children were taught to name the colors incorrectly, and the test repeated. Later they were

taught the correct names and again tested. Peters reports that the children who had no knowledge of color names did not confuse the colors, that those who were taught the same names for the primary and secondary colors confused these wools, but that after the correct names had been learned, no mistakes were made. The influence of false color names, rather than an undeveloped color sense, is the reason offered for the confusion of colors in sorting and matching wools.

Children in grades one to three were given tests in color naming by Bateman (5). He reports that 88 per cent of his subjects named all colors correctly. More difficulty arose with yellow and orange than with any other colors. The girls surpassed the boys.

Children's sense of harmonies for colors and tones is the subject of a study by Dashiell (6). A large group of kindergarten children were observed, with a group of college students for comparison. The children were indefinite in their preference for color harmonies, but preferred the colors in the following order: blue, red, yellow, violet, green, orange. Both sexes preferred blue to all the other colors. The college students' rating was blue, red, green, orange, yellow and violet, the women giving first place to red and the men to blue. The combination red-blue was preferred by the men and yellow-violet by the women.

The color preferences of twenty-five hundred children are reported by Katz and Breed (20). These investigators presented large colored cards to various groups of school children and requested the children to indicate the best liked color. The resulting order of preference was blue, green, red, violet, orange, the favoritism for blue being marked at every age from five to fifteen. A rise in the preference for short wave colors and a decline for long wave colors occurred with increase in age. The children from the poorer districts preferred red, and those from the best districts green and yellow.

A number of six year old boys in a study by Michaels (25) showed a preference order of yellow, red, green and blue. At a later age, the order was blue, red, yellow, green. The preferences of the younger children were far less reliable than those of the older.

As a part of a larger investigation Dorcus (9) determined the preferences of eight to ten year old children, using colored papers of equal brightness and saturation. Blue and orange were rated highest by the girls; red, green, and purple held middle positions,



with yellow the lowest. The boys rated red higher than the girls, but orange and blue again led, and green and yellow are least liked.

In order to determine the extent of color blindness among children, Sulina (37) tested three hundred thirty-six subjects, from one to fourteen years of age. Brightly painted toys were used with the little children, and various card and wool tests with the older ones. This investigator concludes that the color sense is not developed before the end of the second year, basing his results on fifteen cases, but that after two years it begins to function and can be demonstrated (twenty-nine cases). Between the third and sixth years it is completely developed (fifty-three cases). He found no cases of marked color blindness among the children over six years of age, but reports a slight weakness for green in 16-18 per cent of the children.

Baldwin and Stecher (3) devised two tests for perception of color for use with preschool children. The first consisted of sorting colored wools. Four intense saturated colors, red, yellow, blue and green, were used as samples, each being pinned on the lid of a gray box. Forty skeins of wool in tints and shades of the above colors were given to the child, each to be placed in the box marked with the corresponding color. A regular increase in the ability to discriminate correctly was found to exist between the ages of two and five years. A color-card sorting experiment, using one hundred cards in five colors, resulted in marked increase in successes from three to six years. A third test in color naming showed a decrease in the time required to name familiar colors between the ages of three and five.

A color sorting test is included by Stutsman (36) in her "Performance Tests for Pre-School Children." Colored paper discs of four colors, red, yellow, green and blue, are to be sorted into boxes colored correspondingly. In the standardization of this test, the eighteen months old children failed completely, doubtless due as much to failure to comprehend the task of sorting as in failure to discriminate between the colors. Although the task was too long for twenty-four months old children, there were some who attained partial success. In these cases, red was always correct, blue was failed in but once, yellow correct only once and green always a failure. Of the partial successes at thirty months, one child failed with red, one with blue and green, and one with green. There were no failures at thirty-six months.

An adaptation of the Ishihara test for color blindness for use with

young children was devised by Woelfel (42). Thirty-nine subjects between three and six years of age were required to select numbers matching those on the Ishihara plates. The results showed no sex differences, and a closer relation between the score on the test and C.A. than between the test score and M.A. There were no records corresponding to the types of color blindness as classified by Ishihara.

#### *Racial Groups*

The children of six racial groups have been investigated from the point of view of color preferences, the American Indian, the Negro, the Japanese, the Mexican, the Filipino and the White.

Garth (12, 13) has investigated the American Indian, making careful comparisons with full blood Indian children, Indian children with an admixture of white blood, and white children, having large groups of subjects in each case. The strongest color preferences proved to be those of the full blood Indians. They gave first place to red, with blue, violet, green, orange, yellow following in the above order. The mixed Indian and white children gave first place to blue, the rest of the colors in similar order to that above. There appeared to be no sex differences of any marked nature, nor any influence of education with the two above groups. The white children also rated blue highest, although the boys rated red higher than the girls. Education apparently influenced the color preferences of the white children as the rating for all of the colors fell with increase in education, excepting in the case of blue.

Under circumstances similar to those in the above study, Garth and Collado (14) obtained the color preferences of 1,004 Filipino school children. The resulting preference order was red, green, blue, violet, orange, white and yellow. However, these subjects had a very short preference scale as compared with that of white children, indicating some inability to discriminate feelings of difference for the colors when compared. Both sexes prefer red, but the girls rate green higher than do the boys. Red is always highly esteemed, regardless of education, as in the case of the American Indian, but the value of yellow is lowered, and the values of blue and white raised with increase in the length of schooling.

Following Garth's method, Mercer (24) reported the preference order of one thousand negro school children to be blue, orange, violet, green, red, yellow and white. Education tended to suppress the liking for all colors save that of blue. Blue and green were rated

lower by the negro children than by white children. Red was given a higher rating by the boys than by the girls.

Another comparative study of negroes and whites is that of Arlitt and Buckner (2), with three year old children as subjects. The children chose colored silks for doll dressing and colored chalks and paints for drawing and painting, all in the primary colors. With both races the color preferences were slight and were influenced by the materials. A child might prefer red silk, but blue chalk, etc. All the children tended to avoid green, and preferred red and blue to yellow and green. The preferences of the negroes were more decided than those of the whites.

In a study by Gesche (15), Mexican school children were found to prefer red, followed by green, blue, violet, white and orange. The boys and girls agreed fairly closely, although orange was rated higher by the girls than by the boys. Red and green were preferred through the seventh grade, and after this blue led.

Two studies of Japanese children have been made. Imada (19) reports their preference order to be blue, red, green, and yellow, the girls rating red the highest and the boys blue. The study by Hirohashi (17) of school children in Japan, covering a wide range, shows red and yellow to be high on the preference scale in the lower grades, and blue and green in the upper. The older girls preferred white, which was ranked low by the boys.

Of interest here are the investigations of primitive groups of people by Rivers (31, 32, 33). A careful survey was made of the existence of color names in the languages of these tribes, and four distinct stages were found to be present, corresponding roughly to the cultural development and intelligence of the particular group. In the first stage, there was a definite name for red only, with an indefinite one for yellow. No other color names were used. Next there were definite terms for both red and yellow and an indefinite one for green. In the third stage a definite term for green appeared, while a name for blue was borrowed from another language, and in the last stage of development definite terms for blue and green existed but they tended to be confused. Rivers performed many tests, on these subjects, of sorting colored wools, and found that while red and green were seldom confused unless color blindness was shown to be present, blue and green were also constantly confused. He also tested them for color thresholds with a tintometer, and found low thresholds for red and yellow, but a higher one for

blue than is common with Europeans. Rivers concludes that the spectrum is shortened at the blue end for these primitive tribes.

### *Color and Form Perception*

There have been a few investigations concerning the child's perception of color as compared to form. Descoudres (7) gave children the opportunity to match objects by either color or form, and found that the three to six year olds matched according to color, while the children over this age matched according to form.

In an experiment designed to show whether color alone, form alone, or the correct combination of color and form would influence children's choice in matching objects, Tobie (38) reports that up to three years, eight months, the "relative obtrusiveness" of either color or form determines to which of these factors the child will respond. From three years, nine months to five years the child chooses on the basis of color rather than form, although during the latter part of this period form is increasingly heeded. After five years the ability to respond to either color or form appears.

A large group of children, with a group of adults for comparison, were the subjects of an investigation by Goodenough and Brian (16). These subjects were presented with a series of problems where the matching of geometrical objects must take place on the basis of color or form, but could only take place on one of these. Marked age differences are reported. The subjects under three years matched on the basis of form. Beginning at the third birthday and lasting until about six, with the peak at four and one-half, there was a greater relative significance of color as the basis for matching. After six years, again the matching took place chiefly on the basis of form.

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## THE USES OF THE FORM BOARD IN THE MENTAL MEASUREMENT OF CHILDREN

### *A Review and Classification of the Literature*

BY CONSTANCE D. NEWELL<sup>1</sup>

As a supplementary test the form board has held a quite definite place in the mental measurement of children. The form board in offering another approach to the study of intelligence is particularly useful in the case of young children or children with a language handicap. This review, an integral part of a larger investigation,<sup>2</sup> is reported here because of its value to workers in the mental measurement field.

In this review, the various form boards described in the English literature are classified into eight groups on the basis of the problem presented for solution and, in some cases, the ability upon which the solution depends. In the cases where the board might be placed in either of two groups, it was placed in the group whose definition coincided with the most significant factor in the solution of the problem. With each form board the original or earliest available source in which a description may be found, is cited.

#### PICTURE FORM BOARD

In the picture board, a picture from which various forms have been cut appears on the board. The difference in the size and shape of the pieces and the background of the picture serve as guides to the correct solution. An understanding of the meaning of the picture is not essential for a correct solution. Form boards of this type are the following: the horse picture (45), introductory picture puzzle and the special picture puzzle of the Healy-Fernald series (33), and the mare and foal (33).

<sup>1</sup> This investigation was directed by Dr. Beth L. Wellman of the Iowa Child Welfare Research Station.

<sup>2</sup> NEWELL, CONSTANCE D. *The Value of the Form Board for the Mental Measurement of Young Children; a Critical Analysis*. Unpublished master's thesis. Iowa Child Welfare Research Station, State University of Iowa, 1928. Pp. 159.

## PICTURE COMPLETION FORM BOARD

The picture completion form board consists of a picture from which various objects have been cut. All the block insets are of the same shape. A great many additional pieces of the same shape are presented from which the correct pieces must be selected for placement. The choice depends on the understanding of the meaning of the situation represented in the picture. Nothing in the immediate background of the picture gives a clue to the correct choice. There are three form boards of this type: the Healy picture completion test I (33), Healy picture completion test II (31), and the Shaw picture puzzle (66).

## PICTURE PUZZLES

The picture puzzle form board consists of a picture cut into a number of pieces which when fitted together form a complete picture. There are several different kinds of picture puzzles; some of them are cut into pieces by straight lines, some by irregular lines, some are provided with frames into which the pieces fit, while others are pushed into shape on the surface of a table. The graded series of colored pictures described by Kent (41), the Stutsman picture puzzles (68), and the Rossolimo dissected pictures (37), are examples of this type of form board.

## FORM BOARDS WITH GEOMETRICAL INSETS

In this type of form board geometrical shapes are cut from a plain wooden board. Each block fits into a depression of the same shape. The following form boards are included in this group: variations of the Seguin (64) form boards such as the Bair (3), Goddard-Seguin (25), Twitmyer (69), Witmer (88), and Cornell (78) form boards; the Montessori geometrical insets (50), Ferguson form boards (19), Link manual dexterity, spatial perception, and complex form board tests for machinists (48), Dewey form board (16), Worcester form boards (boards 1a and 1b) (65), Bayley form board (6), three disc form board (30), and the three figure form board (30).

## CONSTRUCTION FORM BOARDS

In this type of form board two or more blocks are used to fill each recess or group of recesses in the board. In the following form boards there is but one recess to be filled: Healy construction A (33), Diamond frame test (45), Knox moron test (45), Kempf's diagonal



test (45), arrow form board (18), and Lincoln hollow squares (15). In the following form boards there are several recesses to be filled: Healy construction B (33), Knox imbecile test (45), Knox casuist form board (45), Gwyn triangle test (45), Kent graded series of geometric puzzles (42), Paterson five figure form boards (62), Pintner two figure form board (62), Ferguson form board series (boards 2, 3, 4, 5, and 6) (19), Worcester form board series (boards 2a, 2b, 3a, and 3b) (65), Woolley reconstruction series (81), Dearborn reconstruction puzzles (2 and 2b) (15), and the triangle performance test (Dearborn form board 4) (15).

#### CYLINDERS

In this type of form board, cylinders of various sizes, heights, and diameters are placed in depressions of corresponding size. The Montessori cylinders (50) and Witmer cylinders (34) are examples of this type of form board.

#### PEG FORM BOARDS

In the peg form boards pegs of different shapes are placed in holes of corresponding shapes. The Wallin peg boards (74) are examples of this type of form board.

#### FORM BOARD TESTS OF APPERCEPTION

This is a type of form board involving the perception of a relationship between the parts of the test. The feature profile test (45), the ship test (45), the manikin test (62), and the Bayley manikin doll (6) are form boards of this type.

#### CLASSIFIED BIBLIOGRAPHY

Under the heading for each form board are listed the references to that particular form board. The numbers refer to the references in the bibliography.

##### *Arrow-Board*

Bronner, Healy, Lowe, and Shimberg (11), Dunham (18)

##### *Bayley Form Board & Manikin Test*

Bayley (6)

##### *Cornell Form Board*

Whipple (78)

##### *Casuist Form Board: Knox*

Aden (1), Arthur (2), Bisch (7), Bronner, Healy, Lowe, and Shimberg (11), Johnson and Schrieffer (38), Kent (43), Knox (45), Murdock (52), Pintner (57), Pintner and Paterson (62)

*Dearborn Form Boards*

Bronner, Healy, Lowe, and Shimberg (11), Dearborn (13), Dearborn, Christenson, and Anderson (14), Dearborn, Shaw, and Lincoln (15), Dewey, Child, and Ruml (16), Freeman (20), Gaw (23), Haines (28), Healy (32), Healy and Fernald (33), Ide (35), Jones (39), Kent (43), Knox (45), Leaming (46), Lowe, Shimberg, and Wood (49), Morgenthau (51), Pintner (57), Schmidt (63), Shaw (66), Starr (67), Wells (77), Woolley (80), Yerkes and Yoakum (86)

*Dewey Form Board*

Dewey, Child, and Ruml (16)

*Diagonal Test*

Aden (1), Bronner, Healy, Lowe, and Shimberg (11), Gaw (23), Ide (35), Johnson and Schriefer (38), Kent (43), Knox (45), Pintner and Paterson (62), Wells (77)

*Feature Profile Test*

Aden (1), Arthur (2), Bronner, Healy, Lowe, and Shimberg (11), Gaw (23), Johnson and Schriefer (38), Knox (45), Murdock (52), Pintner (57), Pintner and Paterson (62), Yerkes and Yoakum (86)

*Ferguson Form Board Series*

Bronner, Healy, Lowe, and Shimberg (11), Ferguson (19), Freeman (20), Kent (41)

*Five Figure Form Board: Paterson*

Aden (1), Bronner, Healy, Lowe, and Shimberg (11), Johnson and Schriefer (38), Kent (43), Murdock (52), Pintner (57), Pintner and Paterson (62)

*Hallowell: 3 Disc Form Board; and 3 Figure Form Board*

Hallowell (30)

*Healy Construction A*

Aden (1), Bisch (7), Bronner (9), Bronner, Healy, Lowe, and Shimberg (11), Bruckner and King (12), Dewey, Child, and Ruml (16), Gaw (23), Haines (28), Healy (32), Healy and Fernald (33), Ide (36), Johnson and Schriefer (38), Knox (45), Lowe, Shimberg, and Wood (49), Morgenthau (51), Pintner (57), Pintner and Paterson (62), Schmidt (63), Wells (77), Woolley (80), Worthington (86)

*Healy Horse Picture*

Knox (45)

*Healy Picture Completion Test I*

Aden (1), Arthur (2), Baldwin and Stecher (4), Bisch (7), Dewey, Child, and Ruml (16), Gault (21), Gaw (23), Healy (32), Healy and Fernald (33), Johnson and Schriefer (38), Murdock (52), Pintner and Anderson (58), Pintner (57), Pintner and Paterson (62), Wells (77), Worthington (84)

*Healy Picture Completion Test II*

Bronner (10), Gaw (23), Healy (31), Johnson and Schriefer (38), Kent (43), Morgenthau (51), Perry (55), Wells (77), Worthington (85), Yerkes and Yoakum (86)

*Healy Picture Puzzles: Introductory and Special*

Healy and Fernald (33), Schmidt (63)

*Kent Colored Picture Puzzles*

Kent (41)

*Kent Geometrical Puzzles*

Kent (42)

*Knox Diamond Frame Test*

Aden (1), Bisch (7), Ide (35), Knox (45)

*Knox Imbecile Test*

Bisch (7), Ide (35), Knox (45)

*Knox Moron Test*

Ide (35), Knox (45)

*Lincoln Hollow Square*

Dearborn, Shaw, and Lincoln (14), Lincoln (47)

*Manikin: Pintner*

Aden (1), Arthur (2), Baldwin and Stecher (4), Bridges (8), Gaw (23), Johnson and Schriefer (38), Murdock (52), Pintner (57), Pintner and Paterson (62), Stutsman (68), Yerkes and Yoakum (86)

*Manual Dexterity Tests*

Link (48)

*Mare and Foal: Healy*

Aden (1), Arthur (2), Baldwin and Stecher (4), Bisch (7), Bridges (8), Haines (28), Healy (32), Healy and Fernald (33), Johnson and Schriefer (38), Kent (43), Murdock (52), Pintner (57), Pintner and Paterson (62), Schmidt (63), Stutsman (68), Worthington (84)

*Montessori Cylinders*

Baldwin and Stecher (4), Montessori (50), Woolley (82)

*Montessori-Geometrical Insets*

Montessori (50)

*Seguin Form Board, and Its Modifications*

Aden (1), Arthur (2), Bair (3), Baldwin and Stecher (4), Bisch (7), Bridges (8), Bronner, Healy, Lowe, and Shimberg (11), Doll (17), Freeman (20), Gault (21), Gaw (23), Goddard (25), Hall (29), Ide (34), Ide (35), Ide (36), Johnson and Schriefer (38), Jones (39), Jones (40), Kent (43), Kephart (44), Knox (45), Murdock (52), Norsworthy (53), Pintner (57), Pintner and Paterson (60), Pintner and Paterson (61), Pintner and Paterson (62), Seguin (64), Stutsman (68), Sylvester (69), Sylvester (70), Wallin (71), Wallin (72), Wallin (73), Wallin (75), Wells (77), Whipple (78), Witmer (79), Worthington (84), Young (87), Young (88), Young and Young (89), Young (90)

*Shaw Picture Puzzle*

Dearborn, Shaw, and Lincoln (15), Shaw (66)

*Ship Test: Glueck*

Aden (1), Baldwin and Stecher (4), Johnson and Schriefer (38), Kent (43), Pintner and Paterson (62), Worthington (84), Yerkes and Yoakum (86)

*Stutsman Picture Puzzles*

Aden (1), Baldwin and Stecher (4), Bridges (8), Johnson and Schriefer (38), Kent (43), Pintner and Paterson (62), Stutsman (68), Worthington (84), Yerkes and Yoakum (86)

*Triangle Performance Test: Dearborn Form Board 4*

Bronner, Healy, Lowe, and Shimberg (11), Dearborn, Anderson, and Christenson (14), Dearborn, Shaw, and Lincoln (15)

*Triangle Test: Gwyn*

Aden (1), Bisch (7), Gaw (23), Ide (35), Johnson and Schriefer (38), Kent (43)

*Wallin Peg Boards*

Baldwin and Stecher (4), Goodenough (26), Goodenough (27), Hallowell (30), Stutsman (68), Wallin (74)

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## SPECIAL REVIEWS

CURTI, MARGARET WOOSTER. *Child Psychology*. New York: Longmans, Green and Co., 1930. Pp. ix+527.

The author gives a rigorous systematization of the mass of post-war experimental and theoretical data in the field of child psychology.

In the chapter headings one recognizes the traditional framing of contents in books on child psychology but the contents presented within these old frames and the rigorously objective viewpoint are quite new.

While the viewpoint is throughout objective, it is only the first half of the book which is behavioristic in the narrow sense of the word. Here are presented numerous experimental data concerning the unconditioned responses of the child, the conditioning of responses, systems of conditioned responses including laryngeal habits more or less from Watson's standpoint.

In what might be called for sake of convenience a second part of the book (Chapter 7) the author abandons Watson's trail to pursue the evolution of the child's inner experience. For this transition Walter S. Hunter's experimentation on delayed reaction in animals and children furnishes some objective evidence of the presence within the child's consciousness of ideas of a concrete sort even prior to the formation of laryngeal habits and consequently prior to subvocal activity. The work of Jaensch on eidetic imagery is cited as further evidence of the presence and nature of concrete ideation in the consciousness of the child.

In what we may call the third part, the author systematizes objective experimentation on the child's conscious processes which she has conveniently reduced to two: perception and thinking. The evolution of perception is presented on the basis of experimentation with chimpanzees and children by Köhler, Koffka and Piaget. Stern's Aussage-experiments are cited in evidence of the syncretistic character of the perceptions of the child. Thinking embraces recalling, imagining and reasoning and it is thinking as reasoning or problem-solving which is dealt with more at length. From a genetic standpoint concrete thinking or objective trial and error is earlier and subjective trial and error or ideational thinking comes later. The author relies

very much upon the experimentation of Piaget with regard to the configuration of ideational thought in the child.

A fourth part of the book is devoted to the problem of motivation. After a careful review of the mechanistic formulations by Carr, and Dashiell, motivation is defined as a persistent stimulus, native or acquired, external or internal, that will not down until something is done by the individual towards its removal. Most of motives are intraorganic stimuli arising from the tissue needs and other physiological states at present vaguely known. From a genetic standpoint motivation is first nonconscious in setting off response; a little higher, it may, in a passively conscious way, set off a determining tendency (impulse) and still higher, it may involve conscious decision and deliberate planning or purposing before the act is set off as in voluntary action. Motives are at the base of the self-activation of the child, determining him to learn.

The author is now in position to translate into mechanistic terms Freudian notions of conflict and repression. Functional troubles of the child are for the most part due to the thwarting or inhibition of a motive by counter-motives or stimuli. Compensation, substitution, rationalization, and hysteria furnish pathological satisfactions of thwarted motives.

In the last four chapters Dr. Curti systematizes the various theories of play; the hereditary and environmental theories of juvenile delinquency; the preventive methods proposed for anti-social conduct and environic factors which make for or against the development of a healthy personality.

Only twice in the course of the book does the author depart from the rigorous and critical systematization of experimental data to advance theories of her own; once in the chapter on play in which she expounds her "freedom-theory"; again in the chapter on anti-social conduct when she explains it as habit-formation consequent upon thwarted motives.

An entirely erroneous idea of the tremendous amount of material which is drawn upon by Dr. Curti may result from the mentioning of only a few names as has been done above. In all there are over three hundred contributions to child psychology which have been systematized in this book. Those mentioned in this review probably appear a bit more conspicuous.

Child psychology is no longer a species of applied psychology but rather a branch of pure psychology as anyone will confess after reading this book. It is plainly evident that Dr. Curti's interest in

children is not that of a nurse but that of a rigorous scientist bent upon piecing out the evolution of mind.

The book will no doubt prove a disappointment to many who have not the psychological training prerequisite to an appreciation of it. This is to be regretted for it is one of the outstanding productions of the year in the field of child psychology.

F. C. SUMNER.

*Howard University.*

ARLITT, ADA HART. *The Psychology of Infancy and Early Childhood*. New York: McGraw-Hill Book Co., Inc., 1930. Pp. xiii+382.

In this completely revised edition, Dr. Arlitt has embodied the findings from many of the recent experimental studies of child development. An introductory chapter on problems presented by the preschool child is followed by six chapters on the child's innate equipment in which physiological and neurological structure is given considerable space. The remainder of the book includes chapters on habit formation, sensation and perception, memory, imagination, thought and expression, social attitudes, individual differences and a final chapter on special problems of child development which includes sections on eating and sleeping habits, enuresis, and play. Although the book retains a fair amount of formal material taken over from general psychology, the emphasis throughout is upon problems of child training and the prevention and treatment of conduct disorders.

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#### CORRECTION

IN the bibliography appended to the article by Diserens and Vaughn in the January number of this journal, Miss Washburn's book, the "Animal Mind," was given as of 1917. This reference should have been to the third edition, 1926.

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MARGARET WOOSTER CURTI, *Child Psychology*. New York: Longmans, Green & Co., 1930. Pp. vii+527.

JOHN B. WATSON, *Behaviorism, Revised Edition*. New York: W. W. Norton & Co., 1930. Pp. v+308.

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JULIUS BAHLE, *Zur Psychologie des Musikalischen Gestaltens*. Leipzig: Akademische Verlagsgesellschaft M.B.H., 1930. Pp. 102.

MARJA GRZEGORZEWA, *Psychologie des Aveugles*. Varsovie Nowy Swiat 59—Lwow, Czarnieckiego 12, 1930. Pp. 32.

## NOTES AND NEWS

Dr. William Morton Wheeler has been selected for the Joseph Leidy Memorial Award for 1931, conferred by the Philadelphia Academy of Natural Sciences. The award, which carries a bronze medal and honorarium, will be presented Dr. Wheeler in recognition of his outstanding work on insects, notably his studies in the comparative psychology of ants.

The Midwestern Psychological Association will meet at the University of Chicago May 8 and 9, 1931. Professor L. L. Thurstone will deliver the presidential address Saturday evening. Persons desiring to appear on the program should send abstracts in triplicate to Professor Horace B. English, Secretary, The Ohio State University, Columbus, Ohio, or to Professor John J. B. Morgan, Northwestern University, Evanston, Ill.

Professor George H. Mead, professor of Philosophy in the University of Chicago and for many years the teacher of advanced courses in Social Psychology resigned on February 5. Dr. Mead will lecture at Columbia next year.

DR. G. E. BORING is scheduled to appear on the program of the Fifth Institute of Natural Science, sponsored by Bowdoin College. He will speak on April 11, on "The Rise of Scientific Psychology."

DR. WALTER R. MILES, professor of psychology in Stanford University and visiting research professor of medicine in Yale University, on March 25 addressed a graduate seminar in psychology at Brown University on "Visual Fixation." In the evening he delivered a Marshall Woods lecture on "Dilute Alcoholic Beverages and Human Behavior."

ALBERT PAUL WEISS, professor of experimental psychology, Ohio State University, died at Columbus on April 3, of heart disease. He was born in Germany, September 15, 1879.

RICHARD FITCH, twenty-five years old, an assistant in the psychology department at Columbia University, was killed recently when he fell from the roof of a fourteen-story apartment house.

WASHINGTON UNIVERSITY announces the appointment of John P. Nafe, Ph.D., as professor of psychology and head of the Department of Psychology, effective July 1, 1931, in replacement of Edgar James Swift, Ph.D., head of the department since 1903, who is retiring. Professor Nafe is at present professor of psychology in Clark University at Worcester, Mass.

